Aqueous Emulsion Polymerization of Functionalized Fluoromonomers

Abstract

A method is provided for aqueous emulsion co-polymerization of two or more fluoromonomers comprising the steps of: 1) forming an aqueous pre-emulsion by mixing a fluoromonomer according to formula I:

$$F_2C=CF\text{-}R^1\text{-}SO_2X \qquad (I)$$

wherein R^1 is a branched or unbranched perfluoroalkyl, perfluoroalkoxy or perfluoroether group comprising 1-15 carbon atoms and 0-4 oxygen atoms and wherein X is F, Cl or Br, together with 0.001-0.9 molar equivalents of a base, in the absence of added emulsifier; and 2) reacting the pre-emulsion with one or more perfluorinated comonomers in the absence of added emulsifier so as to form a fluoropolymer latex comprising a fluoropolymer wherein more than 1 mol% of monomer units are derived from the fluoromonomer according to formula I. In another aspect, the present invention provides a fluoropolymer derived from the fluoropolymer latex made according to the method of the present invention which is free of added emulsifier. In another aspect, the present invention provides a polymer electrolyte membrane comprising the fluoropolymer made according to the method of the present invention which is free of added emulsifier.